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Oceans and the law of the sea

Letter dated 16 June 2015 from the Chargée d'affaires a.i. of the Permanent Mission of Monaco to the United Nations addressed to the Secretary-General

I have the honour to bring to your attention the summary of the results of the third workshop, held in Monaco from 12 to 14 January 2015, on the theme of "Bridging the gap between ocean acidification and economic valuation", which was organized by the Monaco Scientific Centre and the Ocean Acidification International Coordination Centre of the International Atomic Energy Agency (see annex).

The full document containing the results will be published for the International Scientific Conference of the United Nations Educational, Scientific and Cultural Organization, in July 2015.

I should be grateful if you would have the present letter and its annex circulated as a document of the sixty-ninth session of the General Assembly, under agenda item 74 (a).

(*Signed*) Valérie **Bruell-Melchior**
Chargée d'affaires a.i.

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[Original: English]

Ocean acidificiation impacts on coastal communities

Summary for policymakers from the Third International Workshop

Bridging the Gap between Ocean Acidification and Economic Valuation

Oceanographic Museum, Principality of Monaco
12 to 14 January 2015

The Third International Workshop on the Socio-Economic Impacts of Ocean Acidification gathered 53 experts from the natural and social sciences from 20 countries. The workshop considered how ocean acidification will affect different coastal human communities and identified potential solutions. Despite uncertainties, particularly related to combined effects with other major environmental stressors, we know enough to act, and action should be taken now. This brochure summarizes the main results of the workshop discussions.

"Ocean acidification is, I believe, one of the greatest scourges resulting from the considerable development of anthropogenic greenhouse gas emissions to have both concrete and global impact." (H.S.H. Prince Albert II of Monaco)

The workshop was organized by the Monaco Scientific Centre and the Ocean Acidification International Coordination Centre of the International Atomic Energy Agency, with the support of the Prince Albert II of Monaco Foundation, the Gouvernement Princier de la Principauté de Monaco, French Ministry of Ecology, Sustainable Development and Energy, the United States Department of State, the International Union for Conservation of Nature, the Institut océanographique — Fondation Albert 1er, the Societé monagasque des eaux and the Association monégasque pour l'acidification des oceans.

Setting the scene: ocean acidification and coastal communities

Ocean acidification is a change in seawater chemistry caused by the absorption of growing atmospheric CO_2 by the ocean. A high-CO_2 ocean is predicted to have effects on marine organisms, including species upon which the economies of coastal communities depend. This could be through direct impacts on commercial species like shellfish, or indirectly via food web interactions and loss of marine habitats, such as coral reefs. These effects are inextricably linked to the impact of other stressors on marine species and ecosystems, such as warming, pollution and overfishing.

This workshop focused on the socioeconomic impacts of ocean acidification on coastal communities and discussions centred around three main topics: (1) coastal economic activities with an emphasis on fisheries, aquaculture and

tourism; (2) modelling as a tool to evaluate bio-socioeconomic impacts of ocean acidification; and (3) potential measures to tackle ocean acidification, including societal action and adaptation, governance and legislation options.

Key messages

- Communities and activities most at risk include:
  - Small scale fisheries and mariculture in developing countries
  - Poorer communities and social groups dependent on subsistence fisheries, with potential gender inequalities
  - Economies reliant on aquaculture of vulnerable species or threatened ecosystems, such as coral reefs
  - Poorly diversified local economies
- Economic impacts of ocean acidification on tourism may include loss of profits and employment, as well as loss of tourist infrastructure, due to decreased storm protection from reefs.
- Reducing the root cause of ocean acidification — CO_2 emissions — must remain the primary goal, even if adaptation options can be considered to buy time.
- Adaptation methods include behavioural change, infrastructure investment and economic means of building economic resilience through loans, tax credits, taxes, insurance, prizes and risk pooling.
- Governance reforms should include mitigation and adaptation actions at the national and subnational levels, as well as multilateral collaboration, capacity-building and technology transfer.
- Build capacity and awareness of ocean acidification at influencer-level and to include it in national education agendas.
- There are significant gaps in our ability to characterize and model the local/regional ocean acidification processes and their impacts on the food supplies and ecosystems through food webs.
- Open-ocean models on ocean acidification are not applicable to coastal assessment and there are currently very few socioeconomic models at a relevant scale for use by coastal communities and managers.
- Ocean acidification impacts need to be assessed in relation to existing trends; for example, declining labour and incomes in capture fisheries; growth of aquaculture; and the impacts of other environmental stressors.

The five thematic areas covered by the workshop

Fisheries and aquaculture

About 38 per cent of global marine capture fisheries production is harvested by small-scale fishers. Small-scale producers account for about 88 per cent of the aquaculture and 85 per cent of the capture fisheries workforce (50 per cent are

women). Over 95 per cent of small-scale fishers live in developing countries, with an estimated 6 million reef fishers in some 100 countries and territories worldwide

Small-scale producers, subsistence fisheries, poorer fishing communities and populations that are heavily dependent on fisheries and aquaculture for their food and revenues (from seafood production, trade and/or tourism) are potentially more vulnerable to ocean acidification.

Marine-based tourism

Tourism is a primary source of revenues in 46 out of 50 of the world's least developed countries. The global value of coral reef-based tourism was estimated at $11.5 billion in 2010 and diving tourism is increasing by 20 per cent a year, four times faster than global tourism. More than 100 countries benefit from tourism associated with coral reefs, many of which are small island developing States.

About 60 per cent of the world's coral reefs are threatened by various environmental stressors, including ocean acidification. This is expected to increase to 90 per cent by 2030 and to nearly 100 per cent by 2050.

Modelling as a tool to evaluate bio-socioeconomic impacts

While modelling of the chemistry of ocean acidification and of the direct effects on some key habitats and commercial species is reasonably well advanced, modelling of impacts on other components of marine socio-ecological systems and processes is very limited due to a lack of knowledge on the general principles and mechanisms behind biological and human response.

Improving models of the biophysical, economic and social impacts of ocean acidification on coastal systems will provide essential input to policy development and decision-making in local resource and environmental management.

Societal action and adaptation

Societal action to tackle ocean acidification includes mitigation, adaptation and a mix of both. Human adaptation is necessary but may be difficult, costly and economically and culturally disruptive. Current geoengineering methods may be feasible locally, but they are not cost-efficient, practical or ethical.

Poorly planned adaptive measures have the potential to create inequalities between populations that can adapt (large, well-financed industries or countries) and those that cannot (subsistence fishermen, poorer countries). Examples of local adaptation actions to improve ecosystem health and resilience include reducing fishing pressures, establishment of marine protected areas and reduction in nutrient inputs.

Governance, Governments and legislation

Governance tools and legislation can help in limiting the source of ocean acidification (CO_2 emissions), reducing its impacts and protecting coastal environments and communities.

Positive examples of successful management of ocean pollution have demonstrated how, through appropriate policies, legal frameworks and international agreements, transboundary issues such as ocean acidification can be addressed.

What can communities do?

Research needs

Information for decision-making

- Improve awareness and knowledge at all levels, including on ocean acidification science and on the costs and effectiveness of adaptation and mitigation actions, and disseminate knowledge of lessons learned and best practices
- Support and extend research initiatives on ocean acidification and linked stressors, including monitoring, particularly for vulnerable coastal communities
- Develop transdisciplinary food-web models for species of interest (capture and cultural) that begin to address the complexities of the coastal system and the potential impact on human well-being
- Develop good practice on two-way communication between scientists and end users

Local and national management

Adaptive management to address complexity

- Improve coastal ecosystem resilience through effective fisheries and aquaculture management, restoration of fish stocks and biodiversity
- Build community resilience by supporting diversified coastal community economies and increasing community engagement in co-management; for example, fisheries
- Explore innovative financing for adaptation (tourist taxes, user fees, public-private partnerships)
- Build ecosystem resilience by reducing local stress factors and creating marine protected areas
- Broaden opportunities for coastal communities by developing tourism attractions based on healthy reef systems and potential alternative leisure activities

International policy

Dynamic leadership to facilitate change

- Work to achieve urgent reduction in CO_2 emissions; we have very little time to reach substantial cuts in emissions and avoid tipping into dangerous zones
- Place ocean acidification, along with other climate change drivers, as a high priority for more countries

- Mainstream ocean acidification into global, regional and national policies, plans and investment strategies for climate change, for oceans and in fisheries and coastal management
- Foster public and private investment in social, economic and environmental capital in communities and regions considered most vulnerable
- Protect blue carbon sinks and design tools to include them in carbon trading
- Make ocean acidification projects eligible to the Green Climate Fund

For list of participants and full report, please visit:

www.centrescientifique.mc/en/Workshops and www.iaea.org/ocean-acidification